

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.

WHAT IS CLAIMED IS:

1. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; a ring member having a larger inner diameter than an outer diameter of said pipe; and a resiliently deformable, cylindrical sleeve member disposed between said ring member and said pipe, at least one of an inner surface of said ring member and an outer surface of said sleeve member being provided with a tapered portion, such that when one of said ring member and said sleeve member is slidably moved, said sleeve member is deformed inward, resulting in tight connection of said inner surface of said pipe to said outer surface of said cylindrical projection; at least one of said ring member and said sleeve member having at least one portion engageable with said joint body, so that when said ring member and said sleeve member are assembled to said joint body, said ring member and said sleeve member are locked to said joint body.
- 10 2. The sleeve-type pipe joint according to claim 1, wherein said ring member has high rigidity.
- 15 3. The sleeve-type pipe joint according to claim 1, wherein an engaging portion of said joint body is an annular groove provided in a root portion of said cylindrical projection.
- 20 4. The sleeve-type pipe joint according to claim 1, wherein an engaging portion of said joint body is an annular projection provided in a root portion of said cylindrical projection.
- 25 5. The sleeve-type pipe joint according to claim 1, wherein an engaging portion of said joint body is constituted by a plurality of annular ridges provided in a root portion of said cylindrical projection.
6. The sleeve-type pipe joint according to claim 1, wherein said sleeve member has at least one slit longitudinally extending in a portion

which is shrinkable by engagement with said ring member.

7. The sleeve-type pipe joint according to claim 1, wherein said sleeve member has at least one projection on an outer surface thereof at a position at which said sleeve member does not engage said ring member in an assembled state of said sleeve-type pipe joint, and at which said ring member rides said sleeve member at the time of connection, thereby preventing the relative sliding movement of said ring member and said sleeve member in a longitudinal direction, by which said sleeve member shrinks in diameter, even when a smaller force than a predetermined level is exerted on the end surface of said sleeve member and/or said ring member before said cylindrical projection of said joint body is inserted into said pipe.

8. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; a high-rigidity ring member having a larger inner diameter than an outer diameter of said pipe and at least one portion engageable with said joint body; and a resiliently deformable, cylindrical sleeve member adapted to be pressed into a space between said ring member and said pipe, at least one of an inner surface of said ring member and an outer surface of said sleeve member being provided with a tapered portion, such that when said sleeve member is pressed into a space between said ring member and said pipe, said sleeve member is deformed inward, resulting in tight connection of said inner surface of said pipe to said outer surface of said cylindrical projection; wherein when said ring member and said sleeve member are assembled to said joint body, said ring member and said sleeve member are locked to said joint body.

9. The sleeve-type pipe joint according to claim 8, wherein said sleeve member has at least one portion engageable with said ring member,

such that said ring member and said sleeve member are not detached from said joint body in an assembled sleeve-type pipe joint.

10. The sleeve-type pipe joint according to claim 8, wherein an engaging portion of said joint body is an annular groove provided in a root portion of said cylindrical projection.

11. The sleeve-type pipe joint according to claim 8, wherein an engaging portion of said joint body is an annular projection provided in a root portion of said cylindrical projection.

12. The sleeve-type pipe joint according to claim 8, wherein an engaging portion of said joint body is constituted by a plurality of annular ridges provided in a root portion of said cylindrical projection.

13. The sleeve-type pipe joint according to claim 8, wherein said sleeve member has at least one slit longitudinally extending in a portion which is shrinkable by engagement with said ring member.

15 14. The sleeve-type pipe joint according to claim 8, wherein said sleeve member has a flange portion, which substantially abuts against a rear surface of said ring member when the connection of said sleeve-type pipe joint is completed.

15. The sleeve-type pipe joint according to claim 8, wherein said sleeve member has at least one projection on an outer surface, which is engageable with an engaging portion of said ring member to prevent the detachment of said sleeve member.

16. The sleeve-type pipe joint according to claim 8, wherein said sleeve member has a plurality of projections extending forward from its front end, each of which has an outer projection in a tip end portion thereof, and said ring member has a plurality of longitudinal notches separated in a circumferential direction in a front portion thereof, whereby said outer projections of said sleeve member engage the rear end surfaces of said

notches of said ring member to prevent the detachment of said sleeve member.

17. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; a resiliently deformable, cylindrical sleeve member having at least one portion engageable with said joint body and a tapered portion on an outer surface; and a high-rigidity ring member adapted to be disposed on an outer surface of said sleeve member and having on an inner surface a tapered portion engageable with said tapered portion of said sleeve member,
5 wherein when said ring member is slidably moved on said sleeve member toward a thicker region of said tapered portion of said sleeve member, said sleeve member is deformed inward, resulting in tight connection of said inner surface of said pipe to said outer surface of said cylindrical projection; and wherein when said ring member and said sleeve member
10 are assembled to said joint body, said ring member and said sleeve member are locked to said joint body.
15

18. The sleeve-type pipe joint according to claim 17, wherein an engaging portion of said joint body is an annular groove provided in a root portion of said cylindrical projection.

20 19. The sleeve-type pipe joint according to claim 17, wherein an engaging portion of said joint body is an annular projection provided in a root portion of said cylindrical projection.

20. The sleeve-type pipe joint according to claim 17, wherein an engaging portion of said joint body is constituted by a plurality of annular ridges provided in a root portion of said cylindrical projection.
25

21. The sleeve-type pipe joint according to claim 17, wherein said sleeve member has at least one slit longitudinally extending in a portion which is shrinkable by engagement with said ring member.

22. The sleeve-type pipe joint according to claim 17, wherein said sleeve member has a flange portion, which substantially abuts against a rear surface of said ring member when the connection of said sleeve-type pipe joint is completed.

5 23. The sleeve-type pipe joint according to claim 17, wherein said sleeve member has at least one projection on an outer surface, which is engageable with an engaging portion of said ring member to prevent the detachment of said sleeve member.

10 24. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; a resiliently deformable, cylindrical sleeve member adapted to be abut against a pipe end-abutting surface of said joint body and having a tapered portion on an outer surface; and a high-rigidity ring member adapted to be disposed on an outer surface of said sleeve member and having at least one portion engageable with said joint body and a tapered portion on an inner surface, wherein when said ring member is slidably moved on said sleeve member toward said joint body, said sleeve member is deformed inward, resulting in tight connection of said inner surface of said pipe to the outer surface of said cylindrical projection; and wherein when said ring member and said sleeve member are assembled to said joint body, said ring member and said sleeve member are locked to said joint body.

20 25. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; and a shrinkable member mounted onto an outer surface of said pipe; said shrinkable member comprising a resiliently deformable sleeve portion having a tapered portion on an outer surface, and a high-rigidity ring portion integrally connected to said sleeve portion via a thin portion; the relative movement of said sleeve portion and said ring portion toward each

other causing said ring portion to get seated on said sleeve portion with said thin portion cut, whereby said sleeve portion is deformed inward, resulting in the tight connection of the inner surface of said pipe to the outer surface of said cylindrical projection.

- 5 26. The sleeve-type pipe joint according to claim 25, wherein said shrinkable member has at least one portion engageable with said joint body.
27. The sleeve-type pipe joint according to claim 25, wherein said sleeve portion has a flange portion
- 10 28. The sleeve-type pipe joint according to claim 25, wherein said sleeve portion has at least one longitudinal slit.
29. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected; and a shrinkable member mounted onto an outer surface of said pipe; said shrinkable member comprising a resiliently deformable sleeve portion integrally having at least one portion engageable with said joint body, a flange portion and a shrinkable portion having a tapered outer surface in this order, with at least one slit extending longitudinally, and a high-rigidity ring portion integrally connected to a rear end of said sleeve portion via a thin portion; the sliding movement of said ring portion toward said joint body causing said ring portion to get seated on said sleeve portion with said thin portion cut, whereby said sleeve portion is deformed inward, resulting in the tight connection of the inner surface of said pipe to the outer surface of said cylindrical projection.
- 20 30. A sleeve-type pipe joint comprising a joint body having a cylindrical projection adapted to be inserted into a pipe to be connected and a flange portion extending near a root portion of said cylindrical projection; and a shrinkable member mounted onto an outer surface of said pipe; said

shrinkable member comprising a resiliently deformable sleeve portion having a tapered outer surface with at least one slit extending longitudinally, and a high-rigidity ring portion integrally connected to a rear end of said sleeve portion via a thin portion; the sliding movement of said ring portion 5 toward said joint body causing said ring portion to get seated on said sleeve portion with said thin portion cut, whereby said sleeve portion is deformed inward, resulting in the tight connection of the inner surface of said pipe to the outer surface of said cylindrical projection.

31. A sleeve-type pipe joint comprising a joint body having a 10 cylindrical projection adapted to be inserted into a pipe to be connected; and a shrinkable member mounted onto an outer surface of said pipe; said shrinkable member comprising a high-rigidity ring portion, at least one portion engageable with said joint body, which integrally extends from a front end of said ring portion, and a resiliently deformable sleeve portion 15 integrally connected to a rear end of said ring portion via a thin portion; said sleeve portion comprising a shrinkable portion having a tapered outer surface and a flange portion in this order from the side of said joint body with at least one slit extending longitudinally; the sliding movement of said sleeve portion toward said joint body causing said sleeve portion to enter 20 into a space between said ring portion and said pipe with said thin portion cut, whereby said sleeve portion is deformed inward, resulting in the tight connection of the inner surface of said pipe to the outer surface of said cylindrical projection.